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Measuring power loss due to radiation and charge exchange in MST JEFF WAKSMAN, BRETT CHAPMAN, GENNADY FIKSEL, PAUL NONN, UW-Madison — An array of photodiode-pyrobolometer pairs will be placed on MST to measure the spatial structure of the radiated power and charge exchange. Photodiodes (XUV detectors) measure photonic radiated power from about 10eV to 10keV, while pyrobolometers (thermal detectors) measure both photonic radiated power and power carried by charge-exchange neutrals. Compared to other thermal detectors, pyrobolometers have very good time resolution. To accurately calibrate the individual detectors, an electron gun producing a modulated square wave output has been set up to carefully calibrate each new pyrobolometer to be placed on MST. When viewing the MST plasma, subtraction of the data from the photodiode-pyrobolometer pairs allows one to determine the net power loss due to charge-exchange neutrals. These measurements are important in the calculation of ion energy balance, and it is potentially important in understanding the difference in the temperatures reached by majority and impurity ions during magnetic-reconnection ion-heating events. Since toroidal and poloidal asymmetries in charge exchange are possible, a distributed array of detector pairs will facilitate a better estimate of global power loss. Work supported by the U.S.D.O.E. .

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